



Research Article

More gender bias in academia? Examining the influence of gender and formalization on student worker rule following

Jaclyn Piatak*, Zach Mohr*

Abstract: Student workers can influence professor productivity through the quality of research or teaching support provided. This is, in part, dependent on whether students follow the directions or rules put forth by the professor. While research on rule following is emerging, we know little about what influences rule following in student-professor work relationships. Using a survey experiment, we examine whether the way in which information is conveyed and who conveys it shapes student rule following. While we find students largely follow rules regardless of whether they are written or unwritten, we find significant gender bias. Male students are less likely to follow instructions given by a female professor than a male professor. Gender bias among student workers is another bias in academia that may influence productivity, but perhaps greater representation could reverse this trend.

Keywords: Gender Bias, Rule Following, Formalization, Representation in Academia

Supplements: [Open data](#), [Open materials](#)

Students can influence faculty members' careers through their input in student evaluations and the quality of their research or teaching support. Given the imperative to "publish or perish" in academia, student assistance at both the undergraduate and graduate levels can contribute to faculty success as studies suggest faculty are more productive at MA- or PhD-granting institutions (e.g., Davis & Patterson, 2001; Hesli & Lee, 2011; Taylor, Fender, & Burke, 2006; Xie & Shauman, 1998) and have access to more resources, including student assistants (Fox & Milbourne, 1999; Hesli & Lee, 2011; Thursby, 2000; Taylor, Fender, & Burke, 2006; Xie & Shauman, 1998). For example, Dundar and Lewis (1998) find departmental research productivity corresponds to the percentage of graduate assistants (Dundar & Lewis, 1998). While student gender bias has been found in student evaluations (Boring, 2017; MacNell,

Driscoll, & Hunt, 2015; Martin, 2016; Miller & Chamberlain, 2000; Mitchell & Martin, 2018; Rosen, 2018), we know little about how gender dynamics may influence the working relationship between faculty and students. Faculty members typically convey instructions and rules to students either verbally or in writing. Written rules are a key attribute of effective rules (DeHart-Davis, 2008; 2017) and are more likely to be followed than unwritten rules (Borry, DeHart-Davis, Kaufmann, Mer-ritt, Mohr, & Tummers, 2018). Regarding gender, research suggests that women are more likely to follow rules (e.g., DeHart-Davis, 2008; Portillio & DeHart-Davis, 2009) but studies have found varying influences of gender congruence for men and women in the workplace (Marvel, 2015; Pedersen & Nielsen, 2016). Since student rule abidance plays a critical role in student workers enabling productivity, how does gender and formalization shape student rule abidance?

To address this question, we employ an experiment to examine the rule abidance of student workers, based on rule formalization, gender, and gender match. Findings have implications for research and practice as we find evidence of gender bias in student

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workers' rule compliance. In the sections that follow, we present the theory and hypotheses followed by a discussion of our survey experiment and the results. We conclude with a discussion of the results, implications, and recommendations to combat student worker gender bias.

Theory and Hypotheses

Rules play a critical role in organizations, dating back to Max Weber (1948). Organizational rules place limits on employee discretion and help with decision making. Public administration research examines issues with rules like overconformity (Merton, 1940) and red tape (i.e., Bozeman, 2000; Bozeman & Feeney, 2014), but recent work highlights the benefits of organizational rules (DeHart-Davis, 2017). However, a key management issue is how to maximize rule compliance. People break rules for a number of reasons, such as self-interest (Lipsky, 1980), performance pressures (Sandfort, 2000), and prosocial motives (Morrison, 2006). Contributing to research in public administration on rules and gender, we examine how rule formalization and gender congruence influence student rule following.

Rule Formalization

Professors convey rules to their student workers in a variety of ways, but primarily in writing or verbally. Research on rule formalization sheds light on how the manner in which a rule is given may influence rule abidance. Formalizing rules – putting them in writing—is a key attribute of effective rules (DeHart-Davis, 2008; 2017). There are many benefits of written rules, including establishing neutral authority (DeHart-Davis, 2008), focusing attention (Borry et al., 2018), and conveying legitimacy (Borry et al., 2018; DeHart-Davis, Chen, and Little, 2013). In turn, women often rely on formal rules as a basis for their authority (Portillo, 2012).

Research has begun to examine the influence of rule formalization on rule following. In experiments of local government employees, Borry et al. (2018) found employees are more likely to comply with written rules compared to unwritten rules. Building on this work, Piatak & Mohr (2018) compare written rules and unwritten rules that are verbally conveyed. Findings illustrate that rule formalization increases rule abidance in both a workplace setting and a non-profit context. Since written rules tend to establish neutral authority, focus attention, and convey legitimacy, students should follow written rules more than

unwritten rules. As such, we build upon this work to examine unwritten rules that are verbally conveyed, where we expect:

H1: Student workers will be more likely to follow written rules than unwritten rules.

Gender and Gender Congruence

In higher education, the story tends to be one of gender bias for female professors. While gender seems to be important for mentoring as students confide more in female professors (El-Alayli, Hansen-Brown & Ceynar, 2018) and women take on a greater share of mentoring responsibilities (Rauhaus & Carr, 2019), gender bias is prevalent in student evaluations as women are consistently rated lower than men (Boring, 2017; MacNell, Driscoll, & Hunt, 2015; Martin, 2016; Mitchell & Martin, 2018; Rosen, 2018). Women are also more likely to be called “teachers,” while men are called “professors” (Miller & Chamberlain, 2000), which suggests varying levels of respect or perceptions of authority for professors by gender.

Before examining the influence of gender match, we first examine the influence of gender. Socialization influences rule following from peers, professions, the organizational culture, and gender (DeHart-Davis, 2017). Due to cultural expectations, women tend to follow rules more compared to men (Portillo & DeHart-Davis, 2009; DeHart-Davis, 2008; Tyler & Blader, 2005; Brehm & Gates, 1997; Reason, Manstead, Stradling, Baxter, & Campbell, 1990; Morrison, 2006). Women managers also tend to rely on formal rules to legitimize their authority (Portillo, 2012). Perhaps because women often lack access to the needed social capital, such as “information and knowledge about institutional norms, expectations, and opportunities; access to and influence on key decision makers; certification and endorsement of an individual’s qualifications; and emotional support and recognition” (Lin, 2001, 280). Since women tend to follow rules more than men due to cultural expectations to follow rules, female students should follow rules more than male students. Therefore, we suspect:

H2: Male student workers will be less likely to follow rules than female student workers.

Less is known about how gender congruence influences rule following. Research on representative bureaucracy illustrates how representation and gender

congruence can influence student outcomes in the educational setting (e.g., Keiser et al., 2002), but few have examined gender congruence in the workplace. While not in the academic context, research has begun to examine gender congruence between principals and teachers. Marvel (2015) found female gender match improves work effort, while Pedersen and Nielsen (2016) find male gender match decreases rule abidance. We build upon this work to test whether gender match or bias prevails in higher education. We ask: Are student workers more respectful of professors who match their gender? More specifically, how does gender match influence rule following? Following the literature on teachers and principals, men should be more likely to disregard rules when the supervisor is also a man, perhaps due to loyalty to the peer group to be able to get away with rule breaking. Meanwhile, women should be more likely to follow the rule when the supervisor is also a woman in order to support their peer group. Thus, we hypothesize the differing effects by gender:

H3a: Female student workers will be more likely to follow the rule when the professor is female, compared to female student workers with a male professor.

H3b: Male student workers will be less likely to follow the rule when the professor is male, compared to male student workers with a female professor.

Methods

We employ a survey experiment to advance our understanding of how student workers follow the written and unwritten rules that are given by their professor. Drawing upon a student subject pool at a large public university in the U.S., we give students a written or verbal rule for grading paper headings and varying whether a male professor or a female professor gives the rule. For the written rule, the professor's name is simply changed. For the verbal rule, the name is changed, and we use male and female audio recordings of the rule that are computer generated for standardization.¹ The student is then asked whether points should be deducted for a heading that violates several of the requirements specified in the professor's heading rule (Figure 1).

As part of an omnibus study, the experimental vignettes were administered to the students through the online survey platform Qualtrics. The students were recruited from mostly undergraduate courses, such as political science, sociology, public policy, education, communication, and public administration,

by instructors who offered extra credit for participation. The omnibus has two parts: the first part is a panel that collects background information on the research participant and then the experimental part that delivered seven experimental modules. Participants completed the survey online at their convenience. Between each of the experimental modules are conceptually neutral tasks that are memory-intensive to clear the impact of the previous experimental module such as remembering sequences of letters and then asking the participant to think about the words that could be formed by those letters. The omnibus encourages attentiveness by informing the research participants that they will be asked questions at the end of the survey about the experiments, and for each answer that they get right they will be entered into a drawing for a \$50 gift card.

Students were randomly assigned to one of the four conditions of male/female professor and written/unwritten rules shown in Figure 1. To ensure that random assignment worked as anticipated, we present the demographic variables of the student sample broken out by condition (Table 1). We can see that the random assignment worked as anticipated with no difference tests being significant. Table 1 also shows that the students are both young and diverse. The average age of the students is just 21.8 years. The overall sample is comprised of 56.9% females. Also, the sample is 58.8% White, 24.5% African American, and 7.4% Latino. The baseline category for the research is all other races, which includes 4.9% Asian, 0.5% Native American, 0.5% Pacific Islander, and 3.4% classify themselves as other. Additionally, we can see that less than half have experience working in the public sector (47.1%) and less than a third have any type of management experience (26.5%).

To analyze whether written rules, gender, and gender match influence rule following, we employ descriptive statistics and multivariate logistic regression. Because the dependent variable is the dichotomous outcome of (1) following the rule or not (0), a binary logistic regression model is appropriate to model these data. The key independent variables are indicators for whether the rule was presented in writing or presented as an unwritten audio clip, gender, and gender match. The categories in the model for gender match are male student and male professor, male student and female professor, and female student and a female professor with a baseline category of female student and male professor. We also break out the genders of the students to look at how both

Figure 1
Experimental Conditions for Student Grading Experiment

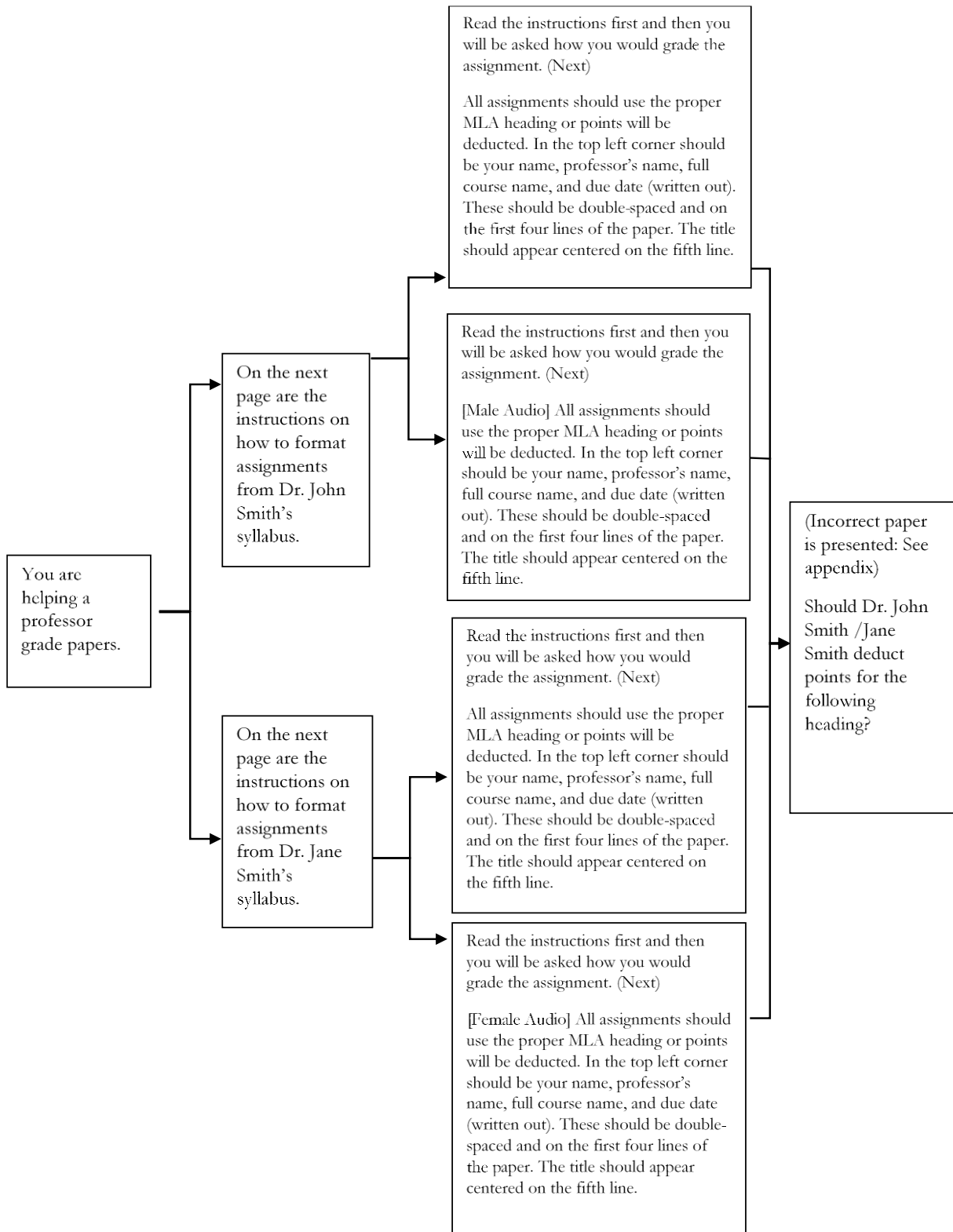


Table 1
Sample Composition of Demographic Variables

	% Female	% White	% African American	% Latino	Public Sector	Mngmt. Exp.	Age in Years
Female Supervisor Unwritten Rule	60.8%	54.9%	27.5%	9.8%	43.1%	25.5%	21.3
Female Supervisor Written Rule	51.9%	69.2%	19.2%	5.8%	38.5%	32.7%	21.9
Male Supervisor Written Rule	62.0%	50.0%	26.0%	10.0%	46.0%	20.0%	22.1
Male Supervisor Unwritten rule	52.9%	60.8%	25.5%	3.9%	60.8%	27.5%	21.9
Mean	56.9%	58.8%	24.5%	7.4%	47.1%	26.5%	21.8
n	204	204	204	204	204	204	204
Difference test	$\chi^2=1.70$ $p=.638$	$\chi^2=4.337$ $p=.227$	$\chi^2=1.108$ $p=.775$	$\chi^2=2.037$ $p=.565$	$\chi^2=5.737$ $p=.125$	$\chi^2=2.160$ $p=.540$	F=.468 $p=.705$

female and male students comply with the rules when there is a gender match, relative to students of the same gender that do not match the gender of their supervising professor. Age is a continuous variable that is constructed from a question that asks the respondent about the year they were born subtracted from 2016. Political ideology is a Likert scale item that ranges from 1=very liberal to 7=very conservative. The model controls for the race of the respondent with the categories of white, African American, and Latino compared to the baseline category of all others. The model also controls for whether they currently work in the public and nonprofit sector, and it controls for whether the student is currently or has ever been a manager.

Analysis

Descriptive Analysis

From the responses to whether the student worker would follow the professor's rule, there are some important insights into student compliance with rules. The first is that student workers tend to comply with rules whether they are written or unwritten (Figure 2). In the grading scenario, the student workers complied with the written rules 76.7% of the time and complied with the unwritten rule 79.2% of the time, which was contrary to our hypothesis. However, this difference is not statistically significant ($\chi^2=0.187$, $p=.66$; Fisher's $p=.396$; $\varphi=0.030$). This is a high rate of compliance for both written and unwritten conditions and slightly different than expected.

As the literature suggests, males comply less with the rule (72.7% complied) when compared with females (81.9% complied). However, the gender of the respondent is only statistically significant at a 10% level ($\chi^2=2.447$, $p=.12$; $\varphi=0.110$; Fisher's $p=.08$).² As will be discussed below, this low level of statistical significance is an artifact of how male respondents responded to male and female professors differently. When we break out compliance by the match between respondents and professors (Figure 3), we see a more complete picture. Rule compliance is statistically significant ($\chi^2=17.52$, $p=.001$) and substantially significant ($\varphi=0.293$). Specifically, male student workers with female professors have a much lower level of compliance than the other student professor pairings. Male student workers with female professors only follow the rule 55.8% of the time as compared to male students with male professors who follow the rule 88.9% of the time – a 33.1 percentage point difference. The gender match for females is less than for males but female student workers comply with the rule more when there is a female professor. Female student workers with female professors follow the rule 86% of the time as opposed to female student workers with male professors who only follow the rule 78% of the time – a difference of 8 percentage points. Generally, these patterns support our gender match hypothesis. To determine whether the difference in compliance is coming from one gender, we next turn to multivariate logit models of rule compliance.

Figure 2
Compliance with Written and Unwritten Rules

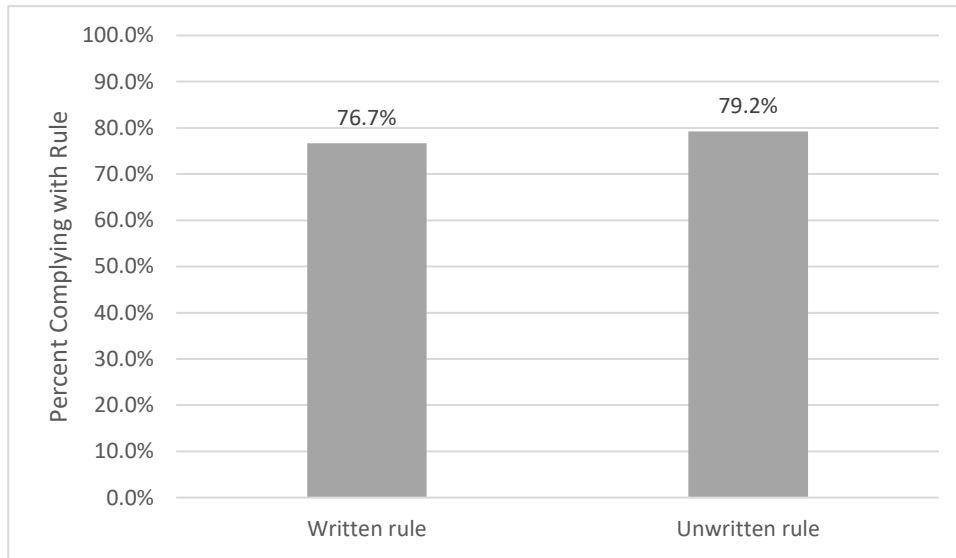
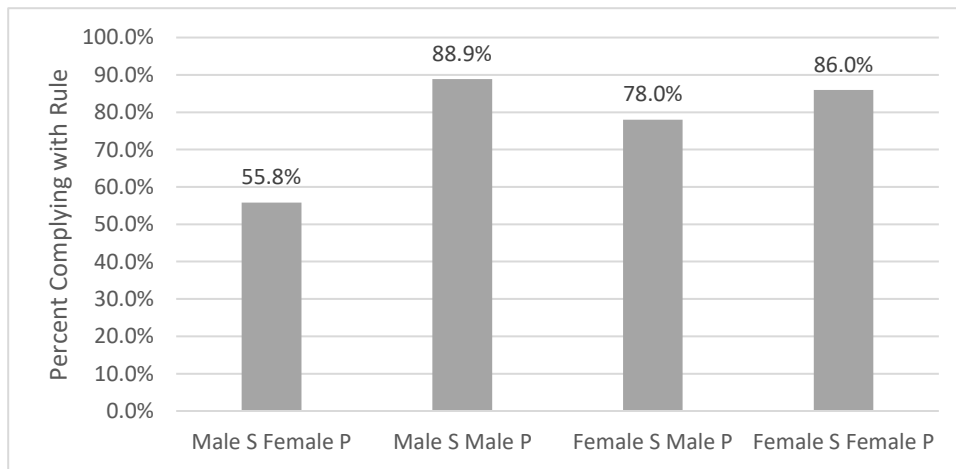


Figure 3
Rule Compliance by Gender Match



Multivariate Analysis

The multivariate models further support the gender match hypothesis for male student workers but not for female student workers (Table 2).³ This suggests that there is a bias among male student workers for following the directions of male professors as seen in both Model 2 and Model 3. Female student workers do not have statistically significant higher levels of compliance when they have female professors as seen in both Model 1 and Model 3. An effect from

rule formalization on compliance is not found in any of the models.

When we look at the models of only female student workers (Model 1) and only male student workers (Model 2), we see important differences in how the students comply with the rules. Female student workers with female professors comply more with the rule than the female student workers with male professors, but the effect is not statistically significant. Male student workers with male professors comply with the rule much more than male student workers

Table 2
Binary Logistic Regression Models of Rule Following

	Model 1. Female Student Model	Model 2. Male Student Model	Model 3. All Student Model
Written rule	0.382 (0.523)	-0.253 (0.551)	0.1 (0.367)
Male S-Female P	-	-	-1.222* (0.495)
Male S-Male P	-	1.785** (0.6)	0.473 (0.612)
Female S-Female P	0.514 (0.518)	-	0.441 (0.507)
Mngmt. Experience	-0.324 (0.634)	0.085 (0.647)	-0.137 (0.448)
Public Sec. Exp.	0.091 (0.523)	0.377 (0.587)	0.235 (0.373)
Age	0.166 (0.137)	0.103 (0.089)	0.117 (0.079)
White	1.207 (0.853)	-0.016 (0.848)	0.566 (0.599)
African American	0.224 (0.832)	-1.166 (0.983)	-0.464 (0.636)
Latino	1.565 (1.342)	-1.846 (1.533)	0.131 (0.898)
Political ideology	-0.154 (0.181)	0.07 (0.194)	-0.032 (0.13)
Constant	-2.592 (2.933)	-2.026 (2.138)	-1.283 (1.726)
n	116	88	204
-2loglik	101.505	84.505	191.017
pseudo r^2	0.11	0.276	0.172

and female professors ($p < .01$). In fact, the impact of the male-male gender match in the male student worker model is that the odds of the student complying with the rule is a nearly six-fold increase.⁴ When we look at the all-student model (Model 3), the baseline category is a female student with a male professor and we can see that the male students with female professors are much less likely to comply with the rule ($p < .05$). In fact, the odds of male student workers with female professors complying with the rules is less than a third of female student workers with male professors.⁵

Whether the rule was written, and the additional model controls are not significant at standard levels. This written rule non-finding is in stark contrast with Borry et al. (2018) and others that have found a very strong effect from putting rules in writing and is also contrary to our hypothesis. We find that in the student populations, the student workers are much less willing to break the rules overall. Students may not be enculturated yet to distinguish between written and unwritten rules and what this can signal to a person that has significant work experience. Importantly for male students, they seem to be picking up cues to

break the rule based upon the gender of their supervisor.

Discussion and Conclusion

A scenario nearly all professors face is how to ensure students follow directions in carrying out their work. Our experiment examines the influence of both how the rule is given and who gives and receives the rule. No significant differences are found for how directions are given, whether they were conveyed in writing or verbally. Males were found to comply less with the rule as suggested in the literature. However, we find the gender of professors has a significant influence on rule abidance. Male student workers with male professors are more likely to follow the rule, whereas male student workers with female professors are significantly less likely to follow the rule, which is a finding that is robust to multiple modelling specifications.

Although scholars highlight the benefits of rule formalization (Borry et al., 2018; DeHart-Davis, 2008, 2017; DeHart-Davis, Chen, & Little, 2013) and Borry et al. (2018) find employees are more likely to abide by written rather than unwritten rules, we do not find a significant difference. This may be due to the different populations used in the studies as undergraduate students tend to be younger and have less work experience, which may contribute to their overall tendency to follow rules. In addition, government bureaucrats have considerable discretion in interpreting and following organizational rules, whereas our scenario is a professor assigning a work task to student workers. An alternative explanation may be that students pay greater attention to verbal directions than written directions.

In line with prior research that finds women are more likely to follow rules due to cultural expectations (Portillo & DeHart-Davis, 2009; DeHart-Davis, 2008), we find men are less likely to follow rules than women. Future research may want to examine factors that influence rule following by gender and how to increase rule compliance among employees across genders.

Unfortunately, our study supports the gender bias narrative in academia. Much like gender bias found in student evaluations (Boring, 2017; MacNell, Driscoll, & Hunt, 2015; Martin, 2016; Miller & Chamberlain, 2000; Mitchell & Martin, 2018; Rosen, 2018), we find gender bias in rule following. Male student workers are less likely to follow directions when they are working for a female professor. This gender

bias may highlight varying levels of respect for women professors, reflected in work that finds students are more likely to call female professors “teachers,” while male professors are referred to by their proper title of “professor” (Miller & Chamberlain, 2000). While students may misunderstand instructions rather than purposefully defy them, our instructions were clear and straightforward, suggesting the latter. Future work should disentangle the root cause of student gender bias.

To our knowledge, few have examined the professor-student working relationship, but research and teaching assistants may be another source of gender inequity. In public administration, women are underrepresented in scholarship (Slack, Myers, Nelson, & Sirk, 1996; Scutelnicu & Knepper, 2018; Knepper, Scutelnicu, & Tekula, 2019), editorships (Feeney, Caron, & Dickinson, 2018), and curricula (Hatch, 2018; Hewins-Maroney & Williams, 2007; Mills & Newman, 2002; Sabharwal, Hijal-Moghrabi, & Royster, 2014; White, 2004), while they tend to be disproportionately represented in lower ranking positions (Sabharwal, 2013). Perhaps greater representation could help address these student gender biases. Future work should examine how assistantships are distributed, how students are assigned to professors, and the student-professor work dynamic. Do men and women have equal access to research and teaching support? Do certain individuals get to work with more experienced or advanced students? Does varying student incentives or pay influence performance? Does the student gender bias found here extend to PhD students with whom professors have closer working relationships? Does the bias extend to other populations, such as historically-disadvantaged groups or those with different sexual orientations?

Acknowledgment

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Notes

1. An important consideration when using different audio recordings in an experimental format is how to make the male and female voices comparable. Male and female speakers have natural differences in their voices such as pitch and volume that may change how people respond to one

voice over the other, especially if one is more pleasing or authoritative. For example, men with higher pitched voices may be regarded as less authoritative (Klofstad, Anderson, & Peters, 2012), which may result in less rule abidance. Therefore, we used Apple OS to create the audio files to make comparable male and female audio clips. This computer generation may increase the artificiality of the voice, but it conveys the gendered nature of the rules in a standardized manner.

2. Pearson chi-squared; Fisher's exact test 1 sided significance value.
3. A robustness model is presented in the appendix that presents the full student model without demographic or experience controls (Table A1).
4. $\text{Exp}(B)=5.96$
5. $\text{Exp}(B)=0.295$

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Appendix

Appendix A. Incorrect paper heading shown

J Nelson

5/6/16

Prof Smith

American Politics

Is government worthwhile? A study of modern democracy

Appendix Table A1
Binary Logistic Model with Treatment Conditions Only

	<u>B (S.E.)</u>
Written rule	0.186 (0.354)
Male S-Female P	-1.036 (0.440)
Male S-Male P	0.817 * (0.569)
Female S-Female P	0.549 (0.494)
Constant	1.175 (0.355)
n	204
-2loglik	198.611
pseudo r ²	0.12

* p<.05